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(54) Title: CARBOHYDRATE ANTIGEN-NANOPARTICLE CONJUGATES AND USES THEREOF AS ANTIMETASTATIC AGENTS IN TREATING CANCER

(57) Abstract: Carbohydrate antigen-nanoparticle conjugates are disclosed. Methods of making carbohydrate antigen-nanoparticle conjugates are also disclosed. The carbohydrate antigen-nanoparticle conjugates can be used to inhibit metastasis of tumor cells in mammals.

INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 A61K39/385 A61K47/48 A61K31/70

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
 IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, EMBASE, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|--|----------------------------------|
| X | WO 02/32404 A (CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS; KIDDLE, SIMON, JOHN;) 25 April 2002 (2002-04-25) page 1, line 4 - line 10 page 3, line 22 - page 14, line 28 figure 1 claims 1-4,11,15,26,27 | 1-13,15, 18-50, 54-76 |
| Y | ----- | 14,16, 17, 51-53, 77-79 |
| | -/- | |

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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| Date of the actual completion of the international search | Date of mailing of the International search report |
| 12 May 2005 | 06/06/2005 |
| Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016 | Authorized officer Ulbrecht, M |

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International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|-----------------------------------|
| X | BARCHI JOSEPH J JR ET AL: "Synthesis and properties of carbohydrate- and glycopeptide-bearing nanoparticles." ABSTRACTS OF PAPERS AMERICAN CHEMICAL SOCIETY, vol. 226, no. 1-2, 2003, page CARB 40, XP009047320 & 226TH ACS (AMERICAN CHEMICAL SOCIETY) NATIONAL MEETING; NEW YORK, NY, USA; SEPTEMBER 07-11, 2003 ISSN: 0065-7727 abstract | 1-13, 15, 18-50, 54-76 |
| Y | | 14, 16, 17, 51-53, 77-79 |
| Y | HAKOMORI S: "ABERRANT GLYCOSYLATION IN TUMORS AND TUMOR-ASSOCIATED CARBOHYDRATE ANTIGENS" ADVANCES IN CANCER RESEARCH, ACADEMIC PRESS, LONDON, GB, vol. 52, 1989, pages 257-331, XP002905215 ISSN: 0065-230X the whole document | 14, 16, 17, 51-53, 77-79 |
| Y | GLINSKY VLADISLAV V ET AL: "Intravascular metastatic cancer cell homotypic aggregation at the sites of primary attachment to the endothelium." CANCER RESEARCH, vol. 63, no. 13, 1 July 2003 (2003-07-01), pages 3805-3811, XP002327998 ISSN: 0008-5472 cited in the application abstract | 14, 16, 17, 51-53, 77-79 |
| Y | GLINSKY VLADISLAV V ET AL: "The role of Thomsen-Friedenreich antigen in adhesion of human breast and prostate cancer cells to the endothelium" CANCER RESEARCH, vol. 61, no. 12, 15 June 2001 (2001-06-15), pages 4851-4857, XP002327999 ISSN: 0008-5472 abstract | 14, 16, 17, 51-53, 77-79 |
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/035831

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|----------------------------------|
| Y | KHALDOYANIDI SOPHIA K ET AL: "MDA-MB-435 human breast carcinoma cell homo- and heterotypic adhesion under flow conditions is mediated in part by Thomsen-Friedenreich antigen-galectin-3 interactions." JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 278, no. 6, 7 February 2003 (2003-02-07), pages 4127-4134, XP002328000 ISSN: 0021-9258 abstract | 14,16, 17, 51-53, 77-79 |
| Y | RAGUPATHI GOVINDASWAMI ET AL: "Vaccines prepared with sialyl-Tn and sialyl-Tn trimers using the 4-(4-maleimidomethyl)cyclohexane-1-carboxy 1 hydrazide linker group result in optimal antibody titers against ovine submaxillary mucin and sialyl-Tn-positive tumor cells" CANCER IMMUNOLOGY IMMUNOTHERAPY, vol. 48, no. 1, April 1999 (1999-04), pages 1-8, XP002328001 ISSN: 0340-7004 abstract | 14,51, 77-79 |
| Y | LLOYD K O: "Carbohydrate vaccines for the immunotherapy of cancer" DRUG NEWS AND PERSPECTIVES 2000 SPAIN, vol. 13, no. 8, 2000, pages 463-470, XP001206504 ISSN: 0214-0934 abstract figure 2 | 14,16, 17, 51-53, 77-79 |
| T | SVAROVSKY S A ET AL: "Synthesis of gold nanoparticles bearing the Thomsen-Friedenreich disaccharide: a new multivalent presentation of an important tumor antigen" TETRAHEDRON: ASYMMETRY, PERGAMON, OXFORD, GB, vol. 16, no. 2, 24 January 2005 (2005-01-24), pages 587-598, XP004743805 ISSN: 0957-4166 the whole document | 1-79 |

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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: **42-76, 79** because they relate to subject matter not required to be searched by this Authority, namely:
Although claims 42-76 and 79 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. Claims Nos.: because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/035831

| Patent document cited in search report | Publication date | | Patent family member(s) | Publication date |
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